

'Black Butte' Trailing Blackberry

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The U.S. Dept. of Agriculture–Agriculture Research Service (USDA–ARS), in cooperation with Oregon State Univ., has had an extensive blackberry breeding program in Oregon since 1928. This program has concentrated on the production of high-quality cultivars for processing, combining the excellent qualities of *Rubus ursinus* Cham. & Schltdl. and those of other North American and European *Rubus* species. 'Marion' has become the industry standard for processing (Finn et al., 1997); while nearly ideal for processing, it is too soft for the fresh market. 'Black Butte' is being released as an early, firm, attractive, and extremely large-fruited trailing blackberry for the fresh, pick-your-own, and homeowner markets. Blackberry growers producing for the fresh market in Oregon rely predominantly on 'Cherokee' (erect type) for the early season, 'Kotata' (trailing type) for the midseason, and 'Chester Thornless' (semierect type) for the late season. 'Black Butte' is expected to be an early-season complement to 'Kotata' in the fresh market.

Origin

'Black Butte', tested as ORUS 1129-1, is the result of a cross of ORUS 830-4 x ORUS 728-3, made in 1986 (Fig. 1), and is a hexaploid based on analysis with flow cytometry (Meng and Finn, unpublished data). The original 'Black Butte' plant was selected in a seedling field in 1988. Its genetic background is extremely diverse, and 'Boysen', 'Marion', 'Olallie', and *R. ursinus* derivatives are all prominent in its pedigree. ORUS 830-4 and ORUS 728-3 have been outstanding parents,

giving rise to several advanced selections. ORUS 830-4 is also in the process of being released as a cultivar.

Description and performance

The cultivar has been tested in Oregon (Corvallis and Aurora) and distributed for

tests in Washington, North Carolina, Arkansas, British Columbia, and New Zealand. The most thorough testing was done at the North Willamette Research and Extension Center of Oregon State Univ., Aurora. The planting was arranged in a randomized complete-block design, with four three-plant replications used for fresh fruit characteristics, budbreak date, harvest season, yield, and berry mass. These data, collected from 1995–96, were analyzed as a split-plot in time with cultivar as the main plot and year as the subplot. While the planting included 15 genotypes, only the data from the cultivars were included in the analysis. In the analysis of these data, the cultivar x year interaction was significant for yield and berry mass. Therefore, the interaction means for these variables are presented.

Yield of 'Black Butte' has been similar to that of 'Marion' but less than that of 'Kotata' (Table 1). The fruit mass of 'Black Butte' is larger (9.6 g/fruit) than any other blackberry cultivar we have grown in Oregon (Table 1). In addition to the replicated trial results, fruit

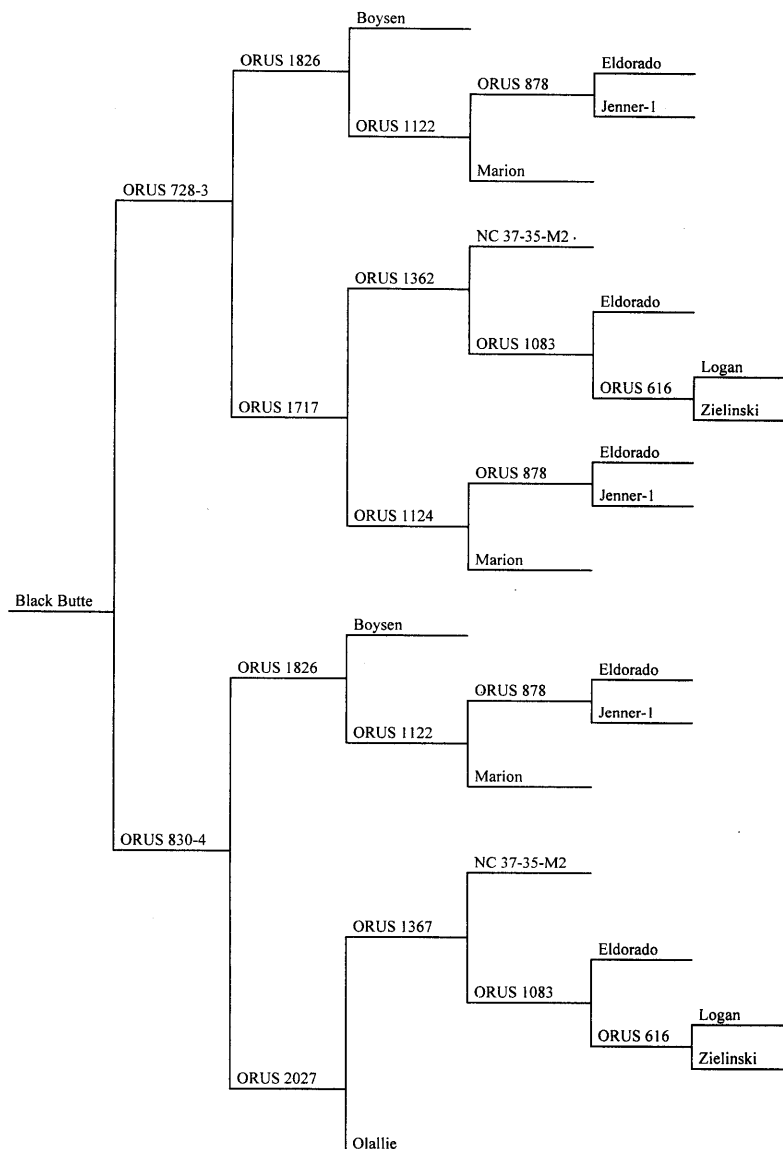


Fig. 1. 'Black Butte' trailing blackberry pedigree.

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Table 1. Yield and fruit mass of five trailing blackberry cultivars in replicated trial at Oregon State Univ.—North Willamette Research and Extension Center, Aurora, in 1995 and 1996.

Cultivar	Yield (kg·ha ⁻¹)			Mass (g/fruit)		
	1995	1996	1995–96	1995	1996	1995–96
Kotata	13063 a ²	16810 ab	14937 a	6.2 cd	4.6 c	5.4 d
Waldo	7978 b	20391 a	14184 a	7.1 c	5.6 b	6.4 c
Marion	5965 b	15078 b	10522 b	5.8 d	4.7 c	5.2 d
Black Butte	7153 b	9798 c	8475 b	11.7 a	7.6 a	9.6 a
Ranui	2370 c	8734 c	5552 c	8.4 b	7.1 a	7.8 b

²Mean separation within columns by Duncan's multiple range test, $P \leq 0.05$.

Table 2. Objective evaluation of fruit characteristics of five blackberry cultivars in replicated trial at Oregon State Univ.—North Willamette Research and Extension Center, Aurora, in 1995 and 1996.

Cultivar	Fresh fruit characteristics ²				
	Firmness	Shape	Texture	Separation	Flavor
Black Butte	8.0 ab ²	9.0 a	7.5 b	9.0 a	6.6 c
Kotata	7.9 ab	8.4 ab	8.0 b	9.0 a	8.0 b
Marion	7.0 c	8.3 b	9.0 a	9.0 a	8.8 a
Ranui	7.3 bc	6.7 c	7.2 b	8.3 b	8.0 b
Waldo	8.3 a	9.0 a	7.8 b	8.3 b	7.0 c

²Rating scale 1–9; 9 = best. Texture refers primarily to the perception of “seediness” when the fruit is chewed. Separation refers to the ease with which the fruit is separated from the calyx.

³Mean separation within columns by Duncan's multiple range test, $P \leq 0.05$.

mass in unreplicated observation plots of ‘Black Butte’ has ranged from 9.9 to 10.5 g since 1991 (data not shown). The fruit are cylindrical/long conic, similar to ‘Marion’, although the fruit tips are more blunt than ‘Marion’ (Fig. 2). Drupelets are consistent in size and shape, giving the fruit a very uniform appearance and reflecting good drupelet fertility. The fruit are firmer than ‘Marion’ (Table 2) and as firm as ‘Kotata’ and ‘Waldo’, which suggests that they should be suitable for fresh market, and are black, similar to ‘Marion’ and ‘Kotata’. ‘Black Butte’ occasionally produces some fruit with red drupelets, which are more common in late-maturing fruit. This discoloration is not from solar injury but may be due to late-maturing drupelets or injury from redberry mite [*Acilites essigi* (Hassan)] or stink bug (Pentatomidae). Fruit have excellent texture although they are perceived as “seedier” than ‘Marion’ (Table 2). The cultivar has not been tested for mechanical harvesting, but in subjective evaluations appears to harvest similarly to ‘Marion’. ‘Black Butte’ has a good fresh flavor, but lacks the strong aromatic components of ‘Marion’ (Table 2). The flavor is more similar to ‘Waldo’ than to ‘Marion’ in subjective evaluations.

In 1996, fruit of ‘Black Butte’, ‘Kotata’, ‘Marion’, ‘Ranui’, and ‘Waldo’ from three harvest dates were bulked and analyzed for

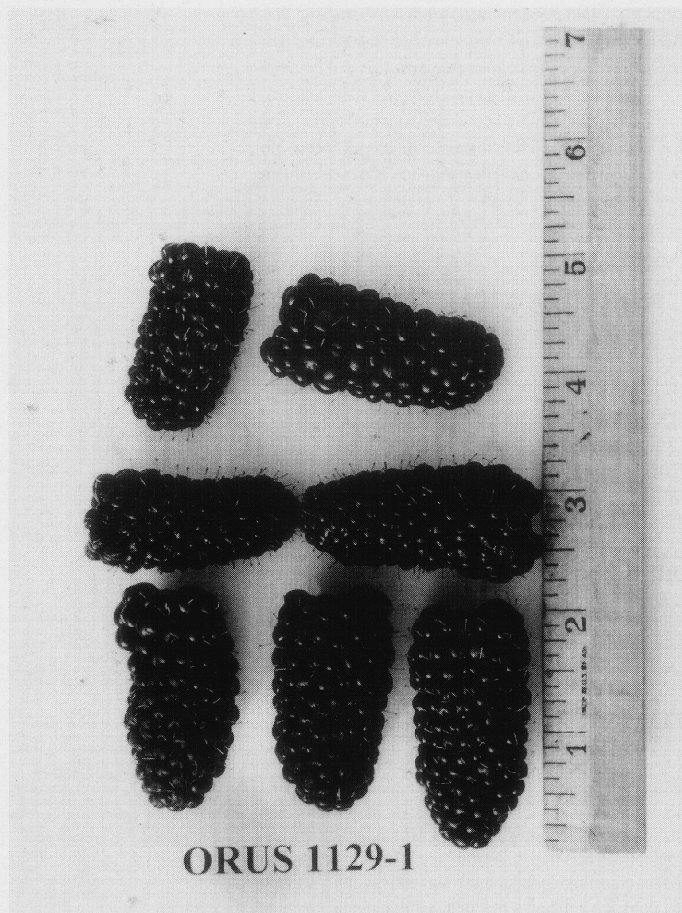


Fig. 2. ‘Black Butte’ blackberries: (left) fruiting plant, (right) harvested fruit [scale in inches (1 inch = 2.54 cm)].

soluble solids, pH, and titratable acidity; fruit were also evaluated for color as a puree and as thawed, individually quick-frozen (IQF) fruit (Table 3). 'Black Butte' fruit had lower soluble solids than all other cultivars except 'Kotata'. The pH was slightly higher than 'Marion', but there was no difference in titratable acidity among the cultivars. Both as a puree and IQF fruit, 'Black Butte' was less black (higher L* values) than 'Marion', 'Kotata', and 'Waldo'; as an IQF fruit, it was more red/less green (higher a* value) than 'Kotata'. In 1997, a panel representing growers, processors, and researchers involved in blackberries was convened to evaluate fruit of 14 advanced blackberry selections and cultivars prepared as IQF, puree, and juice products (Yorgey et al., 1997). 'Black Butte' was judged unacceptable as a processed product in any of these forms, the primary negative characteristics being poor color and the development of "off-flavors" in products made from frozen fruit. Thus, 'Black Butte' is not recommended for the processing market, and should be blended with industry standards when processed.

The primary fruiting season of 'Black Butte' was earlier than 'Marion' and 'Kotata' and much earlier than 'Waldo' (Table 4), but the season can extend for a longer period than that of either 'Marion' or 'Kotata'. 'Black Butte' should complement the fresh-market season of 'Kotata'. Shipping characteristics of 'Black Butte' have not been evaluated but are expected to be similar to those of 'Kotata'. Spring budbreak roughly parallels the fruit ripening period, with 'Black Butte' breaking bud after 'Ranui' but before 'Marion' (Table 4).

'Black Butte' canes are as vigorous as those of 'Marion' or 'Kotata', but the plants produce fewer primocanes. The fruiting laterals extend from the plant and support the fruit without breaking, facilitating harvest. The canes are less thorny than 'Kotata' canes, being more similar to 'Marion' canes.

The cold hardiness of 'Black Butte' has not been fully determined. However, Winter 1995–96 was a good test winter in that temperatures dropped to –11 to –12 °C on several nights during the first week of February when the plants were fully dormant. While 'Marion' suffered some winter injury to flower buds, 'Black Butte' exhibited no visible injury. In previous observation plantings of 'Black Butte', winter injury was never identified as a problem. In the replicated trial, the plants were consistently rated at budbreak as having less winter injury than 'Marion' but more than 'Kotata' (data not shown). In the spring after a cold winter, 'Marion' often appears to have a great deal of bud injury. However, 'Marion'

Table 3. Mean value for five processing characteristics over three harvest dates in 1996 for five blackberry cultivars grown at Oregon State Univ.–North Willamette Research and Extension Center, Aurora, in 1995–96.

Cultivar	°Brix ^z	pH	Titratable acidity ^z	Hunter color–puree ^y			Hunter color–whole berry ^y		
				L*	a*	b*	L*	a*	b*
Black Butte	9.5 c ^x	3.3 ab	1.5 a	29.0 a	10.8 a	3.0 a	10.7 a	7.0 a	3.0 a
Kotata	10.3 c	3.4 a	1.8 a	27.0 c	7.5 a	2.3 a	7.7 c	4.2 b	1.2 a
Marion	13.1 ab	3.1 c	1.9 a	27.5 bc	10.0 a	2.7 a	9.0 b	5.9 ab	1.9 a
Ranui	12.6 b	3.2 bc	1.8 a	27.9 b	9.8 a	2.5 a	10.7 a	5.8 ab	1.9 a
Waldo	14.8 a	3.4 a	1.9 a	27.7 bc	8.9 a	2.1 a	8.9 b	7.3 a	2.3 a

^z°Brix (percent soluble solids) at 20 °C; titratable acidity = g citric acid/100 g fruit.

^yFresh fruit was frozen as individual, whole berries after harvest; color evaluations were done on thawed, whole, and pureed fruit.

^xMean separation within columns by Duncan's multiple range test, $P \leq 0.05$.

Table 4. Date of budbreak and harvest season for five blackberry cultivars at Oregon State Univ.–North Willamette Research and Extension Center, Aurora.

Cultivar	Date of 10% budbreak ^z	Harvest season ^y			
		1995		1996	
		Midpoint	Range (5% to 95%)	Midpoint	Range (5% to 95%)
Black Butte	17 Mar. c ^x	30 June	19 June–31 July	15 July	5–29 July
Kotata	21 Mar. b	5 July	27 June–24 July	22 July	10 July–5 Aug.
Marion	21 Mar. b	7 July	30 June–24 July	22 July	10–29 July
Ranui	13 Mar. d	27 June	9 June–17 July	5 July	1–22 July
Waldo	24 Mar. a	13 July	5 July–8 Aug.	29 July	15 July–12 Aug.

^zDate when 10% of the buds had broken and grown 1 cm. Mean of 1996 and 1997.

^yDates based on dates when yield reached 5%, 50% (midpoint), and 95% of total harvest for a cultivar.

^xMean separation by Duncan's multiple range test, $P \leq 0.05$.

has a remarkable ability for secondary buds to develop to compensate for the loss of primary buds (Strik et al., 1996). The ability of 'Black Butte' to compensate for lost primary buds has not been evaluated.

Under a minimal spray program of dormant fungicides only, 'Black Butte' has shown no major disease problems. Scores for cane and foliage diseases [*Septoria rubi* Westend, *Septocytia ruborum* (Lib.) Petr.] have been similar to those for 'Marion'. The earlier ripening 'Black Butte' is more susceptible to botrytis fruit rot (*Botrytis cinerea* Pers.:Fr.) than is 'Marion'. Damage is only seen very early in the fruiting season as the rainy season is ending. The disease will often appear on the sepals and not damage the fruit. However, if the disease moves into the base of the torus, the berries may drop off or remain small, or the torus within the fully ripe fruit may rot. 'Black Butte' has tested negative for tomato ringspot, raspberry bushy dwarf, and tobacco streak viruses by Enzyme Linked ImmunoSorbent Assay (ELISA) and has indexed negative for each of these viruses when grafted on *R. occidentalis* L.

The outstanding characteristics of 'Black Butte' are its extremely large, black, well-formed, and firm fruit, ease of harvest, and early season production, which are combined

with a plant that is similar to other thorny, trailing blackberry cultivars in habit, vigor, and disease reaction. It is expected to do well where other trailing cultivars are adapted and is recommended for fresh market, pick-your-own operations, and for homeowners.

Availability

'Black Butte' is not patented. A list of nurseries that propagate and sell 'Black Butte' is available from C.E.F., USDA–ARS Northwest Center for Small Fruit Research, 3420 NW Orchard Ave., Corvallis, OR 97330. Plants are available from the same address for nurseries interested in propagating it.

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